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CONTENTS

Philippine Basidiomycetes—IV . . . . . PAUL W. GRAFF 285
Boxwoods of commerce . . . . . SAMUEL J. RECORD 297
INDEX TO AMERICAN BOTANICAL LITERATURE 307

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Vol. 47 No. 11

BULLETIN

OF THE

TORREY BOTANICAL CLUB

NOVEMBER, 1921

Philippine Basidiomycetes—IV

PAUL W. GRAFF

The following pages are presented in continuation of papers already published* on the basidiomycetous flora of the Philippine Archipelago. The fungous flora of the tropics is proving to be much more extensive than had previously been imagined, and the range of many species found to be much wider than formerly supposed. In a few instances species already reported from the Islands have been included for the sake of correction in name, extension of synonymy, and distribution. The value of range-notes is becoming more and more evident when the extension rather than the diminishing area of habitats is noticed. No new species will be found described in this paper, a fact which will doubtless be interpreted by some as a loss of golden opportunity. The identification of species already described and but imperfectly known seems to the writer more important than searching for minor differences as an excuse for creating new plant names and more confusion.

POLYPOREAE

POLYPORUS Micheli

POLYPORUS GILVUS (Schwein.) Fr. Elench. Fung. 104. 1828.

Boletus gilvus Schwein. Syn. Fung. Carol. 897. 1822.

Boletus impuber Sowerb. Engl. Fungi. *pl. 195*. 1799.

* Additions to the basidiomycetous flora of the Philippines. Philip. Jour. Sci. **8**: (Bot.) 299–309. *pl. 8–10*. 1913; Philippine Basidiomycetes—II. Philip. Jour. Sci. **9**: (Bot.) 235–255. *pl. 2*. 1914; Philippine Basidiomycetes—III. Bull. Torrey Club **45**: 451–469. *pl. 15*. 1918.

[The BULLETIN for October (**48**: 263–284. *pl. 4*) was issued December 31, 1921.]

LUZON: Province of Laguna, San Pablo, March, 1913, *P. W. Graff, Bur. Sci. 21052*, on decaying log.

A fungus of rather general tropical, and warm north temperate distribution.

POLYPORUS MARIANNUS Pers.; Gaudichaud, Bot. Voy. Uranie 173. 1826.

Polyporus anebus Berk. Jour. Bot. **6**: 504. 1847.

LUZON: Province of Laguna, Los Baños, October, 1912, *Baker 297*, growing on decaying wood in the forest.

This species was first described by Persoon from material collected by Gaudichaud-Beaupré, of the Freycinet Expedition, on his visit to Guam in the Marianne Islands during the month of March, 1819. It has been considered by Schumann and Lauterbach* as a synonym of *Polyporus Kamphoveneri*, and by Murrill† as identical with *P. corrugatus*, originally described by Persoon from material collected at the same locality and time. It seems, however, that the material preserved in the Paris Museum tallies more closely with Berkeley's species, *P. anebus*, from Ceylon than with either of these two.

As far as at present known the species range includes Africa, Ceylon, Japan and numerous islands of the Pacific.

POLYPORUS OSTREIFORMIS Berk. Jour. Linn. Soc. Bot. **16**: 46. 1878.

LUZON: vicinity of Manila, October, 1912, *P. W. Graff, Bur. Sci. 16795*, growing from a wound on *Enterolobium Saman* (*Pithecolobium*).

This collection is of interest as being the first made since the type material was gathered by the "Challenger Expedition" in February, 1875. The color of both upper and lower surface is a grey-white and the fungus has a slightly foetid odor when fresh.

The species has been collected only in the Philippines.

POLYPORUS RHODOPHOEUS Lév. Ann. Sci. Nat. Bot. III. **2**: 190. 1844.

Polyporus cinereo-fuscus Curr. Ind. Fung. 142. 1874.

Polyporus zonalis Berk. var. *semilaccatus* Berk. Jour. Linn. Soc. Bot. **16**: 46. 1878.

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* Die Flora der Deutschen Schutzgebiet in der Südsee, 1–613. *pl. 1–22.* 1901.

† Bull. Torrey Club **34**: 468. 1907.

Fomes semilaccatus Berk. Grevillea **15**: 22. 1886.

Coriolopsis semilaccata Murr. Bull. Torrey Club **34**: 466. 1907.

LUZON: Province of Laguna, Mount Maquiling, February, 1912, *P. W. Graff, Bur. Sci. 15936*, on decaying tree branches.

A fungus of very general tropical distribution. It is found both in the American and Asiatic tropics and on the islands of the Pacific.

POLYPORUS RUBIDUS Berk. Jour. Bot. **6**: 500. 1847.

LUZON: Province of Laguna, Mount Maquiling, February, 1912, *P. W. Graff, Bur. Sci. 16024*, on fallen and decaying timber.

This species is closely related to *Fomes roseus* (Alb. & Schw.) Cooke, which appears to be of a much broader tropical distribution. It may be that the latter is but a perennial form of the present species, a condition induced by certain tropical environmental factors and occurring in a number of other tropical forms.

Collected previously on the island of Ceylon.

POLYPORUS ZONALIS (Konig) Berk. Jour. Bot. **6**: 504. 1847.

Boletus zonalis Konig, Ann. Mag. Nat. Hist. **10**: 375. *pl. 10, f. 5*. 1846.

Polyporus plumbeus Lév. Ann. Sci. Nat. Bot. III. **5**: 136. 1846.

Polyporus rufo-pictus Berk. & Curt. Grevillea **15**: 23. 1886.

LUZON: vicinity of Manila, August, 1913, *Sanchez 29*.

Reported as having been collected in Cuba, Guiana, Java, and Ceylon.

GANODERMA Karsten

GANODERMA AMBOINENSE (Lam.) Pat. Bull. Soc. Myc. Fr. **5**: 70. 1889.

Fungus digitatus Rumph. Herb. Amb. **6**: 128. *pl. 57, f. 2, 3*. 1755.

Fungus elatus-coclearis Rumph. Herb. Amb. **6**: 128. *pl. 57, f. 1*. 1755.

Agaricus amboinensis Lam. Enc. Méth. Bot. **1**: 49. 1783.

Polyporus japonicus Thunb. Flor. japon. 348. 1784. Not Fries.

Polyporus amboinensis Fr. Syst. Myc. **1**: 354. 1821.

Polyporus fornicatus Fr. Epicr. Myc. 443. 1836.

Polyporus lingua Nees, Nov. Act. Acad. Nat. Cur. **13**: 15. *pl. 3*. 1837.

Polyporus gibbosus Nees, Nov. Act. Acad. Nat. Cur. **13**: 19. *pl. 5*. 1837.

Polyporus coclear Nees, Nov. Act. Acad. Nat. Cur. **13**: 20. *pl. 6*. 1837.

Fomes lingua Sacc. Syll. Fung. **6**: 156. 1888.

Ganoderma amboinense forma *lingua* Pat. Philip. Jour. Sci. **10**: (Bot.) 96. 1915.

LUZON: Province of Laguna, Mount Maquiling, April, 1913, *P. W. Graff, Bur. Sci. 21014*, on decaying log at 500 m. elevation. POLILLO: Province of Tayabas, Mount Malulud, August, 1909, *C. B. Robinson, Bur. Sci. 9101*, at an elevation of 300 m.; same locality, October–November, 1909, *R. C. McGregor, Bur. Sci. 10534*.

This fungus is so variable in the shapes it may assume that it is not surprising the earlier workers described it under a number of names. The writer has seen it growing in a great variety of forms, varying from those having a pileus of considerable size and almost lacking a stipe to forms growing from cracks and holes of decaying logs which had a long slender stipe and a very small fruiting end of no greater diameter than the stipe itself. Branching forms also are occasionally found. An interesting example of one of these branched specimens was found in a Negrito village by one of the Jesuit Fathers, and brought by him to Manila. The specimen had developed five branches and the similarity in shape to a hand was very striking. At the point of branching the fungus had spread in such a manner as to resemble the palm, while the five branches were each tipped with fruiting surfaces, which being lighter in color thus formed the finger nails. The natives of the village had found this specimen in the forest and brought it in on their return. Such a remarkable thing as a hand reaching out of a tree was to them *anting-anting* or supernatural, and the object was being worshiped by these superstitious people.

Such specific names as have been given to this plant at various times, as *digitatus*, *elatus-coclearis*, *coclear*, and *lingua*, give some suggestion of the shapes the plant may assume. It is no wonder that, without available material for comparison, botanists of different countries should each have described this under his own name.

This species has been found in the tropics of South America, the Pacific islands, and Japan.

GANODERMA ELMERIANUM (Murr.) Sacc. & Trott.; Saccardo, Syll. Fung. **21**: 305. 1912.

Amauroderma Elmerianum Murr. Bull. Torrey Club **34**: 475. 1907.

LUZON: Province of Bataan, Mount Mariveles, November, 1904, *Elmer 6906*. LEYTE: Palo, January, 1906, *Elmer 7210*, on dead and decaying tree stumps.

As yet only reported from the Philippines.

Ganoderma leptopum (Pers.) comb. nov.

Polyporus leptopus Pers.; Gaudichaud, Bot. Voy. Uranie 169. *pl. 2, f. 2*. 1826.

Polyporus umbraculum Fr. Elench. Fung. 74. 1828. Not Thüm.

Fomes umbraculum Sacc. Syll. Fung. **6**: 159. 1888.

Ganoderma umbraculum Pat. Bull. Soc. Myc. France **5**: 75. 1889.

Ganoderma subrugosum Bres. & Pat. Bull. Soc. Myc. France **5**: 77. *pl. 10, f. 1*. 1889.

Ganoderma Curranii Murr. Bull. Torrey Club **35**: 411. 1908.

This species was first collected in the Philippines by Dr. H. M. Curran in the forest on Mount Mariveles, Bataan Province, Luzon, and described as a new species, *Ganoderma Curranii*, by Murrill. The fungus was originally described by Persoon from material collected by Gaudichaud-Beaupré on the island of Rawak, and shortly after redescribed by Fries from material collected by Afzelius in Sierra Leone. Later Bresadola and Patouillard described and figured the species from Samoan material and suggested its possible identity with *Polyporus rugosus* var. *guineensis* Fr. The plates of both Persoon and Patouillard give an excellent idea of the fungus, which belongs to the *Amauroderma* section of the genus *Ganoderma*.

GANODERMA TORNATUM (Pers.) Bres. Hedwigia **53**: 55. 1912.

Polyporus tornatus Pers.; Gaudichaud, Bot. Voy. Uranie 173. 1826.

Polyporus australis Fr. Elench. Fung. 108. 1828.

Fomes australis Cooke, Grevillea **14**: 18. 1885.

Ganoderma australe Pat. Bull. Soc. Myc. Fr. **5**: 71. 1889.

Elfvingia tornata Murr. Bull. Torrey Club **30**: 301. 1903.

LUZON: Province of Nueva Vizcaya, vicinity of Dupax, March–April, 1912, *R. C. McGregor, Bur. Sci. 14376*, on decaying timber; Province of Laguna, Mount Maquiling, February, 1912, *W. H. Brown, Bur. Sci. 16033, 16039*.

This species is of general tropical distribution, being found in both the American and Asiatic tropics.

Ganoderma tornatum var. **subtornatum** (Murr.) comb. nov.

Ganoderma subtornatum Murr. Bull. Torrey Club **34**: 477. 1907.

LUZON: Province of Laguna, Mount Maquiling, February, 1912, *P. W. Graff, Bur. Sci. 16025*.

As yet this variety has been reported only from the Philippines, and has been collected there only on the islands of Luzon and Leyte. The type was found on the Lamao River, Province of Bataan, by R. S. Williams in 1903. The variety differs from the species in the greater amount of resinous material in its composition, hardly a specific distinction though causing a slight difference in the appearance of its texture.

FOMES Fries

FOMES EXOTOPHRUS Berk. Jour. Linn. Soc. Bot. **16**: 49. 1878.

LUZON: Province of Laguna, Mount Maquiling, February, 1912, *P. W. Graff, Bur. Sci. 16009*, also April 12, 1913, *P. W. Graff, Bur. Sci. 21031*, on fallen tree branches at 150 m. elevation.

This species was described from material collected in the Admiralty Islands by the Challenger Expedition and is still known only from those islands and the Philippines.

FOMES ENDOTHEIUS (Berk.) Sacc. Syll. Fung. **6**: 187. 1888.

Polyporus endothejus Berk. Jour. Linn. Soc. Bot. **16**: 47. 1878.

Pyropolyporus endotheius Murr. Bull. Torrey Club **34**: 478. 1907.

CULION: December, 1902, *Merrill 3575*.

Originally described by Berkeley from Philippine material collected by the Challenger Expedition in 1875, and as yet not found outside these islands.

FOMES LAMAENSIS (Murr.) Sacc. & Trott; Saccardo, Syll. Fung. **21**: 287. 1912.

Pyropolyporus lamaensis Murr. Bull. Torrey Club **34**: 479. 1907.

Pyropolyporus Williamsii Murr. Bull. Torrey Club **34**: 479. 1907.

Fomes Williamsii Sacc. & Trott.; Saccardo, Syll. Fung. **21**: 289. 1912.

Phellinus Williamsii Pat. Leafl. Philip. Bot. **6**: 2249. 1914.

LUZON, Province of Tayabas, Kabibihan, March, 1911, *F. W. Foxworthy, Bur. Sci. 13155*, on a decaying log.

Of general distribution in the Philippine Islands but, as yet, not reported from elsewhere.

FOMES LINEATUS (Pers.) Graff, Mycologia **9**: 10. 1917.

Polyporus lineatus Pers.; Gaudichaud, Bot. Voy. Uranie 174. 1826.

Polyporus fastuosus Lév.; Gaudichaud, Bot. Voy. Bonite **1**: 180. 1846.

Fomes fastuosus Cooke, Grevillea **14**: 18. 1886.

LUZON: Province of Nueva Vizcaya, vicinity of Dupax, March–April, 1912, *R. C. McGregor, Bur. Sci. 14364;* Province of Bataan, Lamao, November, 1908, *H. M. Curran, For. Bur. 15568.* MINDANAO: Lake Lanao, Camp Keithley, June–July, 1907, *Mary S. Clemens.*

The name *Pyropolyporus fastuosus* as published by Murrill* from Philippine material was applied to *Fomes spadiceus* (Berk.) Cooke instead of to *F. fastuosus* (Lév.) Cooke, as is shown by the duplicate material in the herbarium of the Bureau of Science, Manila. Because of this *Pyropolyporus fastuosus* becomes a synonym of *Fomes spadiceus* rather than of *Fomes lineatus*. Both species of fungus are very common in the Philippines.

Collected in the Philippines, the Moluccas, the Federated Malay States, and the island of Guam.

Fomes Merrittii (Murr.) comb. nov.

Tyromyces Merrittii Murr. Bull. Torrey Club **35**: 406. 1908.

Polyporus Merrittii Sacc. & Trott.; Saccardo, Syll. Fung. **21**: 278. 1912.

* Bull. Torrey Club **34**: 479. 1907.

LUZON: Province of Laguna, Mount Maquiling, November, 1907, *H. M. Curran & M. L. Merritt, For. Bur. 8939*, on dead wood, host species undetermined.

This species belongs to the genus *Fomes* rather than to *Polyporus*, as considered by Saccardo and Trotter.

As yet reported only from the Philippine Islands.

FOMES PECTINATUS (Klotz.) Gillet, Champ. France **1**: 686. 1878.
Polyporus pectinatus Klotz. Linnaea **8**: 485. 1833.
Polyporus Haskarlii Lév. Ann. Sci. Nat. Bot. III. **2**: 190. 1844.
Polyporus pullus Mont. & Berk. Jour. Bot. **3**: 332. 1844.
Fomes pullus Cooke, Grevillea **14**: 19. 1885.
Pyropolyporus pectinatus Murr. Bull. Torrey Club **34**: 479. 1907.

LUZON: Province of Laguna, Mount Maquiling, February, 1912, *P. W. Graff, Bur. Sci. 15931, 16011;* Province of Bataan, Lamao, September, 1907, *H. M. Curran, For. Bur. 7520.*

Collected in North America, Australia, and the East Indies.

FOMES ROSEO-ALBUS (Jungh.) Bres. Ann. Myc. **8**: 587. 1910.
Poria roseo-alba Jungh. Ann. Sci. Nat. Bot. III. **2**: 194. 1844.
Polyporus roseo-albus Jungh. Plant. Java Crypt. 43. 1845.
Fomes mortuosus Fr. Nov. Symb. Myc. 64. 1851.
Polyporus endapalus Berk. Jour. Linn. Soc. Bot. **13**: 163. 1873.
Polyporus caliginosus Berk. Jour. Linn. Soc. Bot. **16**: 46. 1878.
Pyropolyporus caliginosus Murr. Bull. Torrey Club **34**: 478. 1907.
Coriolopsis Copelandii Murr. Bull. Torrey Club **35**: 392. 1908.
Polystictus Copelandii Sacc. & Trott.; Saccardo, Syll. Fung. **21**: 322. 1912.

MINDANAO: District of Davao, Davao, March, 1904, *Copeland 714* (type of *Coriolopsis Copelandii*); Todaya, April, 1904, *Copeland 1214.*

Of general distribution through the Asiatic tropics and the Pacific islands. Originally described from Javan material.

POLYSTICTUS Fries

POLYSTICTUS AFFINIS (Nees) Fr. Nov. Act. Reg. Soc. Sci. Ups. III. 1: 75. 1855.

Polyporus affinis Nees, Nov. Act. Acad. Nat. Cur. 13[1]: 18. *pl. 4, f. 1.* 1826.

Polyporus lateralis Pers.; Gaudichaud, Bot. Voy. Uranie. Sec. M. 1826.

LUZON: Province of Laguna, Mount Maquiling, February, 1912, *P. W. Graff, Bur. Sci. 15954*, on fallen dead branches; Province of Nueva Vizcaya, vicinity of Dupax, March–April, 1912, *R. C. McGregor, Bur. Sci. 14367*, on decaying logs.

This species belongs to the "*Polystictus perula* group" and, with *P. xanthopus*, *P. luteus*, *P. macroloma*, *P. flabelliformis* and several others, goes to make up a series which is much confused in the literature of tropical fungi. Fortunately, however, while this confusion exists in the identification of these species, none of them are overburdened with synonyms.

Of very common distribution throughout the Asiatic tropics and the East Indies.

POLYSTICTUS BATAANENSIS (Murr.) Sacc. & Trott.; Saccardo, Syll. Fung. 21: 322. 1912.

Coriolopsis bataanensis Murr. Bull. Torrey Club 35: 393. 1908.

LUZON: Province of Bataan, Mount Mariveles, January, 1904, *Copeland 143*, on dead tree branches at 230 m. elevation.

Reported, as yet, only from the Philippines.

POLYSTICTUS CALLIMORPHUS (Lév.) Sacc. Syll. Fung. 6: 277. 1888.

Polyporus callimorphus Lév. Ann. Sci. Nat. Bot. III. 5: 133. 1846.

LUZON: Province of Bataan, Mount Mariveles, November, 1912, *P. W. Graff, Bur. Sci. 19105*, on a decaying log at the elevation of 350 m.

Previously collected in Madagascar.

Polystictus caperatus (Berk.) comb. nov.

Polyporus caperatus Berk. Ann. Mag. Nat. Hist. 3: 391. 1839.

Trametes dibapha Berk. Vidensk. Meddel. 32. 1879.

Coriolopsis caperata Murr. N. Am. Flora **9**: 77. 1908.

MINDANAO: District of Davao, Mount Apo, April, 1904, *Copeland 1178*.

Of very general tropical distribution. Reported from the West Indies, Central America, South America and tropical Asia and Africa.

Polystictus Elmerianus (Murr.) comb. nov.

Inonotus Elmerianus Murr. Bull. Torrey Club **34**: 471. 1907.

Polyporus Elmerianus Sacc. & Trott.; Saccardo, Syll. Fung. **21**: 274. 1912.

LUZON: Province of Bataan, Mount Mariveles, November, 1904, *Elmer 6942*, on dead and decaying logs.

Thus far reported only from the Philippines.

POLYSTICTUS FLABELLIFORMIS (Klotz.) Cooke, Grevillea **14**: 78. 1886.

Polyporus flabelliformis Klotz. Linnaea **8**: 483. 1833.

LUZON: Province of Laguna, Mount Maquiling, February, 1912, *P. W. Graff, Bur. Sci. 15933*, on fallen and decaying timber.

This is the second collection reported from the Philippines. The first was made by Warburg, on the island of Mindanao, in 1888. This species has also been collected in Ceylon and the East Indies.

Polystictus nigromarginatus (Schwein.) comb. nov.

Boletus hirsutus Wulf.; Jacquin, Collect. **2**: 149. 1788. Not Scop.

Boletus nigromarginatus Schwein. Syn. Fung. Carol. 72. 1818.

Polyporus hirsutus Fr. Syst. Myc. **1**: 367. 1821.

Coriolus nigromarginatus Murr. Bull. Torrey Club **32**: 649. 1906.

LUZON: Province of Rizal, Antipolo, *H. M. Curran, For. Bur. 7042*. Mindanao, District of Davao, Lake Lanao, Camp Keithley, June–July, 1907, *Mary S. Clemens*.

Wulfen's name being preoccupied by that of Scopoli, Schweinitz's name must be used for this species.

A species of very general distribution.

POLYSTICTUS OCCIDENTALIS (Klotz.) Fr. Nov. Symb. Myc. 90. 1851.

Polyporus occidentalis Klotz. Linnaea **8**: 486. 1833.
Trametes lanata Fr. Epicr. Myc. 490. 1838.
Trametes occidentalis Fr. Epicr. Myc. 491. 1838.
Trametes Wahlbergii Fr. Fungi Natal. 11. 1848.
Trametes scalaris Fr. Fungi Natal. 12. 1848.
Polyporus scorteus Fr. Nov. Symb. Myc. 89. 1851.
Trametes deveza Berk. Jour. Linn. Soc. Bot. **13**: 165. 1873.
Polyporus illotus Kalchbr. Grevillea **10**: 102. 1882.
Coriolopsis occidentalis Murr. Bull. Torrey Club **32**: 358. 1905.

LUZON: vicinity of Manila, August, 1912, *Sanchez 28*.

That this fungus is of very general tropical distribution is shown by the fact that it has been so variously described from such widely separated localities as Brazil, Guiana, St. Vincent, Natal, British India, Ceylon, and the East Indies.

Polystictus Ramosii (Murr.) comb. nov.

Hapalopilus Ramosii Murr. Bull. Torrey Club **35**: 400. 1908.
Polyporus Ramosii Sacc. & Trott.; Saccardo, Syll. Fung. **21**: 276. 1912.

LUZON: Province of Rizal, Bosoboso, July, 1908, *M. Ramos, Bur. Sci. 1198*, on dead *Calophyllum inophyllum*.

This fungus seems to have the characters of the genus *Polystictus* rather than of *Polyporus*.

Collected only in the Philippines.

POLYSTICTUS SUBCROCATUS (Murr.) Sacc. & Trott.; Saccardo, Syll. Fung. **21**: 224. 1912.

Coriolopsis subcrocata Murr. Bull. Torrey Club **35**: 394. 1908.

LUZON: Province of Rizal, July, 1907, *M. Ramos, Bur. Sci. 1859, 1864*.

As yet collected only in the Philippine Islands.

UNIVERSITY OF MONTANA,
MISSOULA, MONTANA

Boxwoods of commerce*

SAMUEL J. RECORD

(WITH ONE TEXT FIGURE)

TURKISH BOXWOOD

The original boxwood of commerce, commonly called Turkish boxwood, is supplied by *Buxus sempervirens* L. (Euphorbiaceae). This species (including closely related forms) has an extensive range throughout central and southern Europe, northern and western Asia, and northern Africa. It is a small tree at best and in parts of its range is reduced to a low shrub valued chiefly for ornamental purposes. The commercial range corresponds roughly to that of the Circassian or Persian walnut and the principal port of origin for wood shipments is Batum.

The wood has been used and prized for many centuries. Its very fine and uniform texture, its light and yellowish color, the ease with which it can be shaped or carved in spite of its horn-like density and irregular grain,† together with its freedom from warping and splitting when finished, have combined to give to this wood a unique place in a specialized field. For the more exacting uses, such as fine engravings, there is no satisfactory substitute.

The wood is not all of the same degree of excellence. The Abassian is considered the best on the American market, followed by the Anatolian and Persian in the order named. Most of the wood used by the Japanese is said to come from Siam and Burma. It is not so highly prized as the native wood (*Buxus japonica* Muell.), is considerably lighter in color, and the bitter taste is much less pronounced. The war stopped shipments of Turkish boxwood and they have not yet (1921) been resumed.

SOUTH AFRICAN BOXWOODS

The growing scarcity of Turkish boxwood stimulated search for substitutes, and in 1885 the East London or Cape boxwood

* Contribution from the Yale School of Forestry, No. 14.

† "There is no . . . box so knotty that dipped in oil cannot be carved." John Lyly: Euphues and his England, p. 368.

was introduced into the trade from eastern Cape Colony, South Africa. This is a true boxwood, *Buxus Macowani* Oliv., and is suitable for engraving, though less highly esteemed than the Turkish for this purpose. The preference for the latter is shown by the fact that block-makers are salvaging used blocks, cutting them into thin layers and gluing these to hard maple backs to get the proper height.

Another wood out of Cape Colony is the Kamassi or Knysna boxwood, also known as East London and Cape boxwood. This is produced by *Gonioma Kamassi* E. Mey. of the family Apocynaceae, which contains many fine-textured woods. The Dutch name is "kamassi" or "kamassihout." Although the wood has a fine and uniform texture it is not adapted for engraving and has found its principal use in the weaver's trade for shuttles and bobbins. It has practically disappeared from the New York market.

TROPICAL AMERICAN BOXWOODS

Much of the boxwood of commerce is now supplied by the forests of the American tropics under the general name of "West Indian boxwood." There has been much confusion regarding the identity of the species producing this material. In most works of reference it is erroneously referred to *Tecoma pentaphylla* Juss. (= *Tabebuia pentaphylla* Hemsl.) of the family Bignoniaceae. This mistake arose about 1884, apparently as the result of the incorrect labeling of a wood specimen in the museum at Kew, England. The wood actually produced by this tree has none of the properties of boxwood and is locally known as "roble" (oak), name giving some idea of its appearance.

In 1880, A. Ernst published a note in the Botanisches Centralblatt to the effect that the tree supplying the boxwood of Venezuela was *Aspidosperma Vargasii* DC. (Apocynaceae). He gave the local name as "amarilla yema de huevo," referring to the resemblance of the color of the wood to that of the yolk of an egg.

In 1914, Sprague and Boodle contributed a paper to the Kew Bulletin of Miscellaneous Information in which they established the identity of certain specimens of West Indian or Venezuelan boxwood as *Casearia praecox* Griseb. (Samydaceae or Flacourtiaceae). They expressed the opinion that the wood referred to

by Ernst as *Aspidosperma Vargasii* and by others as *Tabebuia pentaphylla* was in reality *Casearia praecox* or some closely related species of this genus.

"ZAPATERO" AND "AMARILLO" OF VENEZUELA

The present writer finds that instead of one there are at least three so-called West Indian boxwoods on the market. The principal one is, as Sprague and Boodle state, *Casearia praecox*. This is the "zapatero" of Venezuela. Whether or not Ernst was right in referring the particular specimen he described to *Aspidosperma Vargasii* (his description indicating *Casearia*), it seems definitely established that this species has produced considerable quantities of boxwood, though it is now almost if not entirely out of the American market. There is evidence available that there is at least one other species of *Aspidosperma* in Venezuela producing "amarillo," as the wood of that genus is locally known. There are still other species in Brazil which are in the boxwood class, particularly *A. eburneum* All., the "piquia marfim." *Esenbeckia Atata* Pittier (Rutaceae) has many properties in common with the zapatero and the amarillo but, so far as known to the writer, this wood is not on the market.

"BAITOA" OR SAN DOMINGAN BOXWOOD

The third West Indian boxwood is from Santo Domingo. This first came to the writer's attention in 1918 in the form of a battery commander's ruler. The wood proved to have the same structure as the "palo lanza" or "guayabi amarillo" of northern Argentina. Through the courtesy of the Director of the New York Botanical Garden the writer was able to establish the identity of these woods as *Phyllostylon brasiliensis* Capanema (= *Phyllostylon rhamnoides* Taubert = *Samaroceltis rhamnoides* Poisson) of the family Ulmaceae. This identification has since been confirmed by Mr. C. D. Mell, who at the writer's suggestion made some observations on the species while on a trip to Haiti. This tree, of which there is supposed to be only a single species, is known to occur in Argentina, Brazil, eastern Cuba, Santo Domingo and Haiti. See FIG. 1.

The wood reaches the New York market in considerable quan-

tity from Santo Domingo, where it is known as "baitoa" and sometimes as "bois blanc." There is not much information available regarding its distribution, but it is known to occur in the val-

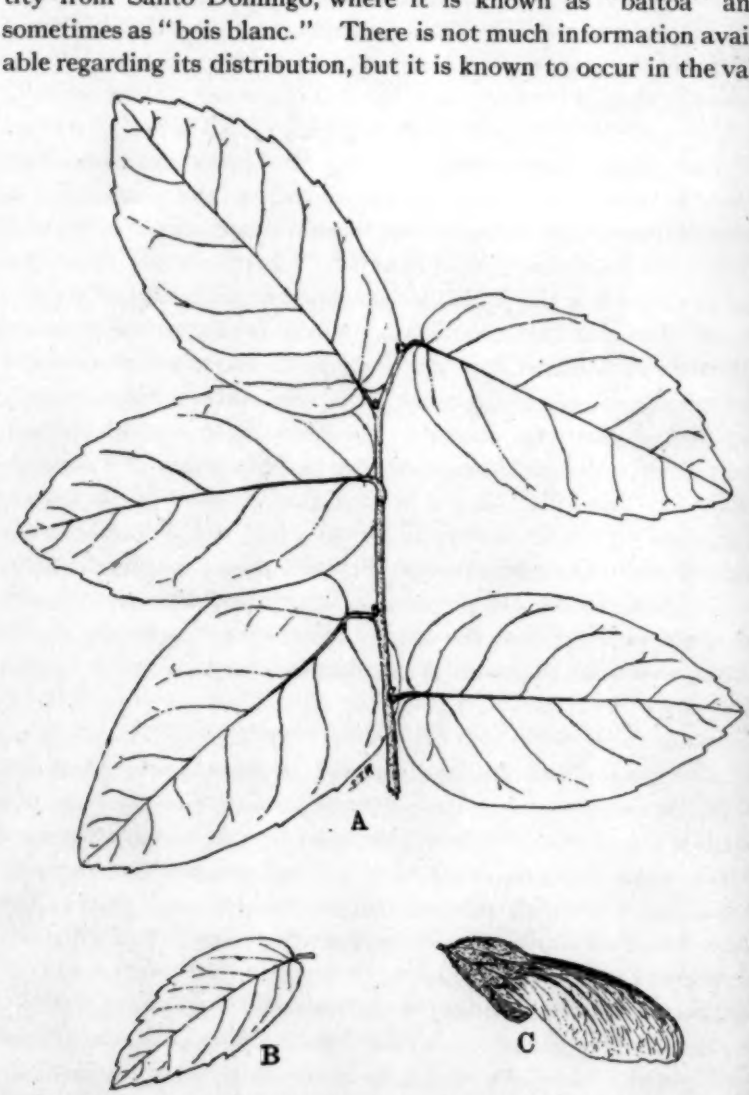

FIG. 1. PHYLLOSTYLON BRASILIENSIS Capanema. *A*. Twig and leaves from Haiti. *B*. Smaller leaf from Oriente, Cuba. *C*. Fruit from Cuba. All natural size.

leys of the Yaque del Norte and Yaque del Sur, where it is a common tree in small pure stands or in mixture with other trees. It reaches there a diameter of 20 inches and is from 50 to 70 feet

high. Mr. Mell found it quite abundant in parts of Haiti, where it reaches the same dimensions and has the same habits as above mentioned. A common characteristic noted is the fluted trunk and the presence of abundant epiphytes on the branches. The wood is little used locally. The following is from his notes:

> The "bois blanc" is one of the most common trees in the dry calcareous regions of the west and north of the island and is said to be most plentiful in the flat and arid regions south of Gonaives in Haiti and on the low dry foothills and lower slopes of the mountains around Puerto Plata in Santo Domingo. Only rarely is it found on the upper slopes and tops of the mountains. It appears to prefer the flat lands that are dry and rocky where it is often found growing thickly in pure forest.
>
> The crowns of the trees are so open that in the pure stands the sunlight reaches the ground and the trees are accordingly rather short boled. In mixture with other trees casting a denser shade the height is greater and occasional specimens may be seen that are 30 feet to the first large limb and as much as 18 inches in diameter breast high. Usually the trunks are irregular and few of them are suitable for lumber.
>
> The leaves are small and not very numerous. Every tree, regardless of its site or associates, seems to be full of epiphytic plants which appear to interfere with its development.
>
> The wood is not esteemed very highly by the natives except for making fence posts and square timbers for buildings of all kinds. Only the smaller sizes are used and the large trees do not seem to be cut for any purpose.

The San Domingan boxwood is inferior to both of the woods from Venezuela. It is not suitable for engraving but makes satisfactory shuttles (its principal use at present) and a fair grade of rulers. It varies in color from very light to canary yellow or light brown. An interesting feature of its structure is the presence of calcium carbonate in a large proportion of the vessels, readily visible with the lens and sometimes without it. The effervescence resulting from the application of a drop of hydrochloric acid to the end of a specimen affords a very simple and reliable means of separating this wood from the others of the group.

SOME OTHER WOODS CALLED BOXWOOD

The flowering dogwood, *Cornus florida* L. (Cornaceae), is sometimes called American boxwood, presumably because of its use in the place of the true boxwood for shuttles. Since the color is reddish or greenish instead of yellowish and the rays are pronounced there is no occasion to confuse it with the other woods of the group. *Schaefferia frutescens* Jacq. (Celastraceae), a small tree of southern Florida and the West Indies, is sometimes known as boxwood but it does not enter the market.

In Australia the name box is applied to various species of *Eucalyptus* and to *Tristania conferta* R. Br. (Myrtaceae). The structure of these woods is distinct from the boxwoods of commerce. The writer is as yet unable either to verify or disprove the statement often met with that the boxwood of the Bahamas is *Vitex umbrosa* Sw. (Verbenaceae). Apparently there is no such wood on the market.

USES OF BOXWOOD

The principal uses of boxwood are for engraving, manufacture of mathematical instruments, shuttles, turnery, musical instruments, and in the form of veneer for inlay and marquetry. The Japanese use it for making combs. Jewelers use wheels of it for burnishing and the sawdust for polishing. There was formerly considerable demand for it by makers of roller skates. The manufacture of boxwood spools for wires in telephone boxes made use of considerable small Turkish boxwood sticks but composition spools have replaced the wooden ones.

The use of wood engravings persists in spite of the advance of other methods. The number of engravers in the United States is said to be about 200 of whom 150 are located in Chicago. The blocks are cut edge-grain and are seven eighths inch high. The best blocks measure 2 x 2 inches free of the pith and can only be procured from logs measuring not less than $4\frac{1}{2}$ inches in diameter. Cuttings from these blocks are built up into blocks of any desired size. Small defects may be bored out and plugged.

APPEARANCE OF BOXWOOD LOGS

The boxwoods are imported in the form of logs or small sticks. The Turkish, East London, and Knysna varieties look like cordwood in the round and are usually very knotty and crooked. The material is usually sorted as to sizes in the yards of the dealers, and Turkish boxwood sticks as small as one inch in diameter are merchantable.

The logs of Venezuelan boxwoods are 8 to 12 feet long, mostly straight, smooth and round, and vary in diameter from 6 to 20 inches, mostly 6 to 10 inches. The larger logs are commonly sawed in half lengthwise and stored in dry sheds to prevent splitting.

The "baitoa" logs from Santo Domingo are from 8 to 20 inches in diameter and 10 or 12 feet in length. They are irregular, and may be more or less fluted. The more prominent irregularities are usually hewn off. A pile of this material resembles a lot of sugar maple logs.

Boxwood logs are measured at the small end, usually outside the bark. Owing to the tendency of the West Indian boxwoods to discolor in a humid atmosphere it is necessary to store the logs in a dry shed.

BARK CHARACTERS OF THE BOXWOODS

The bark characters of the different woods are distinctive. In *Buxus sempervirens* the bark is extremely thin, usually not more than $\frac{1}{16}$ inch, is gray in color, and clings tightly to the wood. In *B. Macowani* it is rather thick, $\frac{1}{8}$ to $\frac{1}{4}$ inch, composed of an inner dark layer and an outer lighter corky layer in narrow longitudinal ridges suggesting white ash.

In *Gonioma Kamassi* the bark is about $\frac{1}{4}$ inch thick, shows two distinct layers the outer of which is yellow on cross-section but grayish on the surface, irregularly fissured and somewhat flaky.

Aspidosperma Vargasii has a bark about $\frac{1}{4}$ inch thick, with a thick deep-yellow inner layer and a thin outer layer composed of laminations alternating light and dark. There are no concentric lines in the inner bark and the phloem rays are scarcely distinct with a lens. The outer surface shows large splotches of gray, has short horizontal fissures and very irregular shallow vertical ones.

In *Casearia praecox* the bark is from $\frac{1}{8}$ to $\frac{3}{16}$ inch thick, indistinctly two-layered, the outer being thin, smoothish, brown or mottled, and with fine vertical wrinkles in the smaller sizes and flaking off irregularly to a light gray without furrows in the larger. Inner bark has distinct wedge-shaped rays and concentric zones, and, when fresh, exudes a resin which stains the edge of the wood.

In *Phyllostylon brasiliensis* the bark is from $\frac{3}{16}$ to $\frac{7}{16}$ inch thick, without distinct layers. The outer surface in young specimens is greenish-gray, somewhat wrinkled, and with prominent lenticels which may be elongated horizontally; in large logs the color is ashy gray, smoothish-granular or with irregular corky ridges. The inner bark shows numerous fine wavy rays and very fine

concentric lines, and with irregular wedge-shaped patches here and there extending from the outer surface to varying depths. The inner surface shows a storied structure more or less distinctly under the lens. The number of ripple marks per inch of length is about 140.*

Descriptive key to the boxwoods of commerce

(Microscopic features)

A. Vessel perforations scalariform (mostly 5–10 bars). Wood parenchyma diffuse and in short tangential rows; no concentric lines. Rays heterogeneous; large cells thick-walled; pits into vessels small, half-bordered. Fibers without gelatinous layer; often arranged in fairly definite radial rows, and somewhat flattened at termination of growth rings. Pores open, well distributed, single, rounded, mostly under 0.03 mm. (tang. diam.). Vessel pits small, border circular, aperture very small, dot-like. Growth rings defined by narrow pore-less zones.

a. Wood fibers with inconspicuous, indistinctly bordered pits. Rays 1–3, mostly 1 or 2, cells wide; 1–15, in some specimens 1–30, cells high; max. 0.02 mm. × 0.25 — 0.40 mm. TURKISH BOXWOOD; *Buxus sempervirens* L.

b. Wood fibers with distinctly bordered pits; sometimes very prominent. Rays 1–3, mostly 2, cells wide; 1–20, mostly 8–10, cells high; max. 0.02 mm. × 0.17 mm. EAST LONDON or CAPE BOXWOOD; *Buxus Macowani* Oliv.

B. Vessel perforations simple.

a. Wood parenchyma absent or very rare. Rays narrow, 1–3 cells wide; crowded; few to 75 cells high; max. 0.03 mm. × 1.5 mm.; heterogeneous; crystals very common; pits into rays very small, half-bordered, with lattice-like appearance. Fibers with gelatinous layer in part; often in definite radial rows due to crowding of rays; sometimes falsely septate with resin-plates; pits simple but often conspicuous. Middle lamella often very thick at corners and of a deep yellow color. Pores open, arranged mostly in radial rows of 2–8, usually 2–4; commonly not flattened; mostly under 0.04 mm. (tang. diam.). Vessel pits very small with slit-like apertures which may extend beyond borders and appear to coalesce into spirals. Growth rings present but more distinct under simple lens than under compound microscope. ZAPATERO, or (COMMON) WEST INDIAN or VENEZUELAN BOXWOOD; *Casearia præcox* Griseb.

b. Wood parenchyma present and distinct. Rays rarely 40 cells high.

a[1]. Rays homogeneous or nearly so; mostly uniseriate; 1–20 cells high; max. 0.01–0.02 mm. × 0.30 mm.; pits into vessels half bordered. Parenchyma diffuse; rarely in tangential lines except at margins of growth rings. Fibers without gelatinous layer; some tendency to radial arrangement; pits distinctly bordered. Pores single; comparatively large; larger pores 0.06–0.07 mm. (tang. diam.); open. Vessel pits comparatively large with apertures extending beyond borders. Growth rings defined by narrow pore-less zones. AMARILLO, or VENEZUELAN BOXWOOD; *Aspidosperma Vargasii* DC.

* The only other member of this family (Ulmaceæ) in which ripple marks are known to occur is *Holoptelea integrifolia* (Roxb.) Planch.

b^1. Rays heterogeneous; 1–4, mostly 2–3, cells wide; 1–30 or 1–40 cells high. Parenchyma in tangential lines.

a^2. Wood fibers with thick gelatinous layer and yellowish granular contents; no radial arrangement; pits small, indistinct, simple. Pores in part filled with calcium carbonate; sometimes with tyloses; arranged singly or in radially compressed rows of 2–5; larger pores 0.04–0.05 mm. (tang. diam.). Vessel pits comparatively large with elongated apertures; segments in horizontal seriation (tangential section) with parenchyma strands (mostly 2 cells per strand), and with low rays. High rays usually constricted slightly at junction of tiers (2 to 5 per ray); width 0.025–0.04 mm., heights in multiples of about 0.17 or 0.18 mm. up to five; pits into vessels large, simple to distinctly bordered; crystals common. Growth rings limited by line of wood parenchyma: slight difference in density. BAITOA, or SAN DOMINGAN BOXWOOD; *Phyllostylon brasiliensis* Cap.

b^2. Wood fibers without gelatinous layer and without contents; tendency to radial arrangement; pits distinctly bordered. Pores open or with yellowish gum contents; arranged singly or occasionally in pairs; larger pores about 0.04 mm. (tang. diam.). Vessel pits very small; segments not in horizontal seriation. Rays 1–30 cells high; max. 0.03–0.04 mm. × 0.6 mm.; pits into vessels small, half bordered, lattice-like appearance; many cells with yellow contents; no crystals observed. Growth rings due to narrow pore-less zones. KNYSNA or KAMASSI BOXWOOD; *Gonioma Kamassi* E. Mey.

CHECK LIST OF THE COMMON NAMES OF THE BOXWOODS

Buxus sempervirens: Box, boxwood, Turkish boxwood (general); Abassian, Anatolian, Circassian, Corsican, English, Parthenian, Persian, and Turkish boxwoods (trade); buis, buis commun, buis beni (French); gemeine Buchsbaum, Buchsbaumholz, Buchsholz (German); buxo, madeira de buxo (Portuguese); boj, madera de boj (Spanish); bosso, bosso comun, bossolo (Italian); boksboom, boksboomhout, busboom (Dutch); buxbom, buxbomsträ (Swedish); boksboom buksbom (Danish); tsuge, hontsuge, asama-tsuge, benten-tsuge, kara-tsuge, detchiki (Japan); wong-yong, huan-yang (China); fang-guyan-gmok (Korea); shanda laghúne (Afghanistan); chikri (Kashmir); papri, papar, paprang, shamshad, shumaj (Punjab); shibsashin (Byans); box (Anglo Saxon); buxus (Latin); teasshur (Hebrew).

Buxus Macowani: Cape boxwood, East London boxwood, African boxwood (Trade).

Gonioma Kamassi: Kamassi boxwood, Knysna boxwood, East London boxwood, Cape boxwood (trade); kamassi, kamassihout (Dutch).

Casearia praecox: West Indian boxwood, Venezuelan boxwood, Maracaibo boxwood (trade); India boxwood (European trade); zapatero, sapatero, naranjillo (?), limoncillo (?) (Venezuelan); raspalenga (?), zapatero (Cuba); buis d'Amérique (French).

Aspidosperma Vargasii: West Indian boxwood, Venezuelan boxwood (trade); amarillo, amarilla yema de heuvo (Venezuelan).

Phyllostylon brasiliensis: San Domingan boxwood (trade); baitoa, bois blanc (Santo Domingo); bois blanc (Haiti); pao branco (Brazil); ibirá-katú, ibirá-catú, palo lanza, palo lanza negro, yaó-si-guazú, tala grande, palo amarillo (Argentina).

INDEX TO AMERICAN BOTANICAL LITERATURE

1911–1921

The aim of this Index is to include all current botanical literature written by Americans, published in America, or based upon American material; the word America being used in the broadest sense.

Reviews, and papers that relate exclusively to forestry, agriculture, horticulture, manufactured products of vegetable origin, or laboratory methods are not included, and no attempt is made to index the literature of bacteriology. An occasional exception is made in favor of some paper appearing in an American periodical which is devoted wholly to botany. Reprints are not mentioned unless they differ from the original in some important particular. If users of the Index will call the attention of the editor to errors or omissions, their kindness will be appreciated.

This Index is reprinted monthly on cards, and furnished in this form to subscribers at the rate of three cents for each card. Selections of cards are not permitted; each subscriber must take all cards published during the term of his subscription. Correspondence relating to the card issue should be addressed to the Treasurer of the Torrey Botanical Club.

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